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ABSTRACT

The purpose of this paper is to present a conceptual basis for advocacy of an inquiry-based instructional model. Focusing on the teacher as inquirer, the paper discusses the nature of inquiry, presents its conceptual framework and describes in detail the use of question strategies in the preschool program. The definition of inquiry analyzes structure and function of the question, particularly manifest and latent message levels. Discussion of the conceptual basis examines concepts of distancing (from the immediate behavioral environment), tension and discrepancy, relating resolution of discrepancy to cognitive growth. Types of distancing behaviors are described, with specific examples given of basic questioning strategies for the preschool classroom. Tentative conclusions point to the consistency of the concepts and rules presented with certain current theories of cognitive growth. (BF)

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An Inquiry into Inquiry: Question-Asking as an Instructional Model

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I keep six honest serving men
(they taught me all I know)
Their names are What and Why and When
And How and Where and Who

Kipling, The Serving Men

Currently, advocacy of question-asking as an instructional strategy rests on pragmatic sources--namely, question-asking promotes thinking. Since teaching for thinking is a "social good" and a desirable educational objective, question asking as a method of choice seems to be a reasonable choice (Taba, 1962, 1967; Suchman, 1961).

Accepting the proposition that question asking is good, a number of investigators have undertaken studies that deal with question asking as an instructional and as an information processing model, types and frequency of teachers' use of questions (Haupt, 1966; Isaacs, 1974), modification of children's question asking behavior (Rosenthal & Zimmerman, 1972; Zimmerman & Pike, 1972), determinants of incidence of types of questions children ask (Berlyne & Frommer, 1966) and children's question asking strategy (Mosher & Hornsby, 1966; Denney & Conners, 1974).

All these studies share two characteristics, (1) question asking is a "good" since it is a method of problem solving, and (2) question asking by

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children reflects thinking and question asking by teachers promotes thinking. More precise work has been reported demonstrating that the type of question is also a factor in determining the efficacy of question asking in problem solving (Boller, 1973; Buggey, 1972; Hopper, 1971; Martin, 1970; Mosher & Hornsby, 1966; Smith, 1974; Turner & Durrett, 1975). These studies, however, while demonstrating the efficacy in question asking, have not provided a systematic conceptual base for advocating question asking instruction or even why use of questions should enhance problem-solving skills. It is important to provide a conceptual base, not only for explanatory purposes, but also for extending research to further our understanding of the role of questions in cognitive development.

The purpose of this paper is to present a conceptual base for advocating an inquiry-based (question asking) instructional model. While the use and comprehension of question asking by children is an important topic in its own right, as well as a possible outgrowth of inquiry teaching, we believe such a discussion is too complex for this presentation. However, as we proceed we shall find it necessary to allude to the child as an inquirer.

To provide a coherent discussion of the conceptual basis for inquiry teaching, we shall first address the definitional question of inquiry, follow this with a presentation of our conceptual framework, then move to a brief description of a preschool program which is inquiry based, with a presentation of teacher strategies for inquiry. Some tentative results from our research will conclude our presentation.

Paradigm for Question Asking

Question asking serves to provide direct confrontation to the equilibrated state of the child, thereby challenging the existent system. In this way, asymmetries are created which create disequilibrium which in turn can lead to restructuring of thoughts. It is this process that Piaget argues "constitute the fundamental factor in cognitive development" (Piaget, 1977, p. 17). Thus, question asking instructional strategies provide a critical exogenous set of stimulations which creates the conditions for a shift from one cognitive level to another.

The development of a model for question asking necessitates the following characterization: structure function, processes activated, strategy in executing the model, and evaluation of responses. Formal inquiry as an instructional strategy is embedded in the social context of the school, which involves a set of ecological factors, e.g., class organization, educational program, relationship of child to teacher, etc. Each of these features will be explicated, thereby providing an organization whole by which to conceptualize question asking strategy.

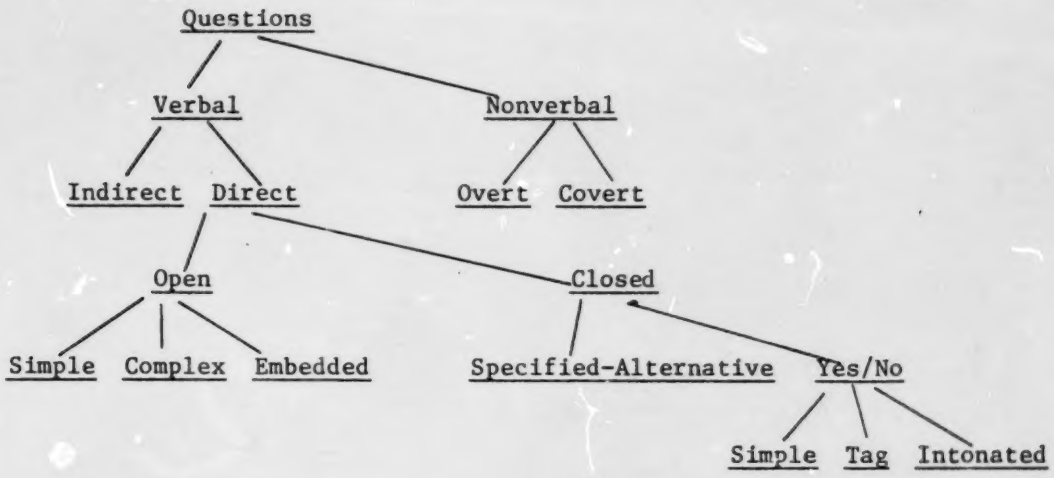


Figure 1. A taxonomy of question forms (Kearsley, 1976).

What is a question? The taxonomy of questions is presented in Figure 1. This categorization is a structural one, based on syntactic elements. Questions have a characteristic form, with the exception of indirect questions, where the inflection is in the utterance or in the intent, e.g., "Tell me about your trip to the zoo." As written it can be classified as a directive statement, with emphasis on "tell," or it can be stated with the inflection on "zoo."

While the structure of most direct questions takes the wh form, i.e., what, why, where, who, when, each of these wh's sends a different message.

Whether the question is direct and open, it can still vary between simple, complex, and embedded. These structural components may have different effects depending, of course, on the developmental level of the child. A simple question, e.g., "What do we need to build a house?"; whereas a complex question takes a form e.g., "If we wish to build a house, what do we need to do it; and finally, an embedded question, e.g., "This is a nice house which we have built. What do we need to build it, because if we could figure it out, it will help us next time?"

The particular wh term employed sets the direction for the addressee. To be asked "where" orients one in space, whereas "why" asks for causal analysis. As we shall see later when we come to explicate the rules of the question, the particular emphasis here orients the child to aspects of reality. The initial question, while orienting the child in a certain direction, is just the beginning of the activation process. The question posed in response to the initial inquiry carries the process further, creating the possibility for new confrontations. The following dialogue can best illustrate the way the second question moves the child beyond the initial inquiry.

An example from Piaget illustrates the differential responses that occur when the questions use different wh forms or structure.

E: What is a brother?

C: A boy.

E: Are all boys brothers?

C: Yes

E: Is the boy who is the only one in the family a brother?

C: No.

E: Why are you a brother?

C: Because I have sisters.

E: Am I a brother?

C: No.

E: How do you know?

C: Because you are a man.

E: Has your father got brothers?

C: Yes.

E: Is he a brother?

C: Yes.

E: Why?

C: Because he had a brother when he was little.

E: Tell me what a brother is.

C: When there are several children in the family?

(Piaget, 1959, p. 104-105)

The questioning does help the child make his idea implicit. The questioning shifts from direct questions to indirect questions. In addition, How questions are used. The illustration demonstrates also how

the questions shift targets and messages--from definintions, e.g., "What is a brother?" to a request to verify, "How do you know?"

The complexity of the question refers to both syntactic content and temporal quality. A set of elements may be incorporated in any single inquiry. For example, "Where did you go with Mary yesterday while you were visiting New York?"; or, "Do you think that if I boiled the water first and then put the egg in it would take as long for the egg to get hard?" The structure of the question is complicated by a series of clauses, differences in temporal features, etc.

Another critical structural attribute is the message in the inquiry. The message involves a particular content that demands a response frequently in complex questions. The message may not be clear, because of how the question is structured or because the content is not comprehended, requiring the respondent to decide just what the question is. We will return to this issue later when we come to discuss content in functional terms.

Psycho-functional features of question asking. All questions inherently contain a demand for a response, whether the question is direct or indirect. There are at least three types of responses to a question: (1) a relevant response which reveals a direct compliance to the message; (2) a response that is irrelevant, e.g., (T): "What kinds of animals did we see when we visited the farm?" (A) "My brother has a new bike"; and (3) ignoring by nonattending or leaving the scene.

Kearsley provided a structural/form model which presupposes that content forms the substance or content. Every question is asked about something--known or unknown. As we shall see this is of particular importance as a teaching stragegy since it is via content that the teacher contributes

to the child's substantive learning.

While the temporal feature can be considered structure, in the strict grammatical sense, it seems from our perspective to also define a functional contribution orientation. The particular temporal aspect has considerable potential in influencing the development of representational schema because it can refer to the past, the ongoing present or the future. A question, asking the child to recount previous experiences in contrast to anticipating what will happen, exemplifies the interplay of content and temporal relations. While recollection is a retrieval of an already experienced event, response may be easier than anticipating and dealing with incomplete knowledge. Further, both the temporal and content comprehension will vary with the development of the child. While structural analysis of questions are general characteristics that can in fact be independent of the developmental level of the child, the content and temporal reference have to be gauged relative to the child's experiential developmental state. For example, Vygotsky (1962) points out that the young child finds it easy to remember, but the adolescent can not only remember but apply it to the future. Thus, the temporal orientation of a question will differentially affect the child's response, depending on the child's comprehension of time.

Every question, by its very structure, poses a <u>demand</u> for response. If the child elects not to answer, he/she is in effect violating the expectancy of the inquirer, since the normative expectancy is for the respondent to acknowledge the inquiry by some type of response. Thus, the primary <u>function</u> of every question (we are excluding rhetorical questions, which are not "true" questions in the context defined here) is to elicit a response.

The type of response anticipated can vary as a function of the open-closed characteristics of the question. If the question is closed, the appropriate response will be closely tied to the content. "John, what is your brother's name?" or, "What color is this pencil?" In each instance, the type or class of response is clear; in the first instance, a boy's name is expected, while in the second example, a color is expected. It would certainly be a surprise if the reverse came about, to wit, the child gave a color to the first question and a boy's name to the second question. But, it is possible when Johnny is asked his brother's name he answers, "Red." This would perforce create an unanticipated discrepancy--since "Red" is ambiguous for it could be a brother's nickname. Thus, while it is possible for surprises to occur in response to closed inquiries, the probability is that the expected response fits a class.

By contrast, open-ended questions, while structurally a type of question, have responses that are not as clearly predictable. For example, asking a child, "What did you do yesterday?" can elicit an answer that can deal with any number of events or actions.

An effective feature of the open-ended question is the consequence of the lack of specificity in the demand expectations. For example, if the question is asked, "What can you tell me about your trip to the orchard," the demand quality is less specific; the particulars required are ambiguous; the amount of information required is unstated, and the correctness of the response is not clear. While the child may believe he/she has produced <u>all</u> the necessary information and has answered the question, the teacher may not agree and may well proceed with another question. (Such a response from

the "question" need not be unique to a teacher-child interaction. Adult-adult communication may function similarly.) Since there are no criteria for what is required, the respondent is not sure when the question is indeed answered relative to the request of the questioner.

The functions described above are related manifestly to content and to structure. However, questions can function on a less explicit level. The tone, the timing, the accompanying gestures can serve to communicate demands that may not even be intended. The same question, e.g., "What is your brother's name" when uttered in a benign manner, may be interpreted by the child as just a request for information; but if uttered in an imperious tone or cloaked in suspicion, may be interpreted as a threat (Katz, 1977).

In sum, questions covering two levels of messages, manifest which is present in the contents and structure; and latent, which is tacit and expressed in the tone or the ambiguity. Each of these features is not isolatable, since they in part form a unit. The recipient of the question potentially can receive all the messages. The nature of the response is no doubt influenced by how the recipient encodes the units.

The analysis of the questior in terms of its structure and function leads us now to our conceptualization of an inquiry strategy as a teaching strategy.

Conceptual Basis for Question Asking

Questions can and usually do demand two things, (1) to deal with the nonobservable, and (2) resolve discrepancies. Luria has cogently stated the first--a perspective consistent with Piaget (1951) and Vygotsky (1962). Luria writes:

> Men can deal even with "absent" objects and so duplicate the world through words, which maintain the system of meanings whether or not the person is directly experiencing the objects the words refer to. Hence a new source of productive imagination arises: it can reproduce objects as well as reorder their relationship and thus serve as the basis for highly complex creative process....Such codes enable a person to go beyond direct experience and to draw conclusions that have the same objectivity as the data of direct sensory experience (Luria, 1976, p. 10).

Using questions as a teaching base is justified because of the awareness that the human being can deal with "absent" objects and this process becomes possible because of our ability to transform experience into representations--images, language, external actions.

The capability of re-presenting experience makes question asking a viable strategy. The opportunities for active re-presenting is enhanced when children are presented with queries. Thus, the process begins. At issue now is what the query does psychologically.

Inquiry can create a discrepancy, or a mismatch between sets of events: It is because of such a realization that we were led to develop a dialectical model, which in turn provides the necessary interactions highly appropriate for cognitive development (Sigel & Cocking, 1977).

Inquiry can create tension: Posing an open-ended question in contrast to a closed one, imposes a demand for an answer, but with no message as to what constitutes a "correct" or "appropriate" answer. Whereas a closed question usually has a clear referent as well as a clear message, an open

question forces the respondent to decide what is appropriate and how much to say. For example, "What can you tell me about your trip to the orchard?" is an open-ended question allowing for many options--the child can begin at any point in the history of the trip, relate any number of possible events, feelings or what not. This is in contrast to a closed question, e.g., "Did you go to the orchard? Who took you? How did you get there?"

The tension is created by the adult's request that the child reconstruct a previous experience with minimal guidelines as to "correctness" of the response, as well as with the requirement to select from an array of options that which he thinks best meets the adult's demands. The child is required to represent a previous experience, as the question forces the child to distance himself in time and place from the present. The interrogator is using a distancing behavior, that is, an inquiry which asks the child to "create temporal and/or spatial and/or psychological distance between self and object. Distancing is proposed as the concept to denote behaviors or events that separate the child cognitively from the immediate behavioral environment" (Sigel, 1970, p. 111-112). The response to the distancing strategy is a re-presentation of a past experience or a construction of an anticipated experience. In the example of the reconstruction of the trip to the orchard, the child has to separate himself mentally from the ongoing present, re-present the trip, and transform the retrieval information in the same symbolic way--e.g., words, gestures, pictures, etc.

The tension generated by this type of question may well be minimal because the inquirer's demands are relatively straightforward. However, this may well be the beginning of the interaction. Further tension can be generated by following up the child's answer by another question, or

beginning an inquiry dialogue. For example, "Could we have gone to the orchard any other way" (basing this on the child's report that the trip was by car). Now the teacher is asking the child to consider alternatives--in effect creating a discrepancy between what was (the ride in the car) and what might be or might have been. Now the child has to think of alternatives. Again, the cues are limited and the responsibility for coming up with an adequate solution is left to the child. It is this type of responsibility in the context of solving that we argue enhances cognitive growth.

Functions of distancing behaviors and of discrepancy. Distancing behaviors vary in the degree to which they activate the separation of the person from the ongoing present. Where simple declarative statements require passive listening and associative responses, open-ended inquiry demands active engagement (Sigel & Cocking, 1977). Thus, the cognitive activity demands "function as instigators, activators, and organizers of mental operations" (Sigel & Cocking, 1977, p. 216).

Discrepancy created by inquiry "propel the organism to change because of the inherent nature of the organism's inability to tolerate discrepancies" (Sigel & Cocking, 1977, p. 216).

Distancing behavior creating discrepancies we hypothesize contributes in a major way to cognitive development. Our contention is that the inquiry generates tension while creating a discrepancy; thereby increasing the stress level; and this stress causes disequilibrium; which the child strives to resolve via some mental action (Sigel & Cocking, 1977). The resolution is perhaps short-lived. Another question can reinstitute the cycle.

Discrepancies may be of any of the following: (1) discrepancy between an internal perspective and an external demand, e.g., in a conservation experiment with clay where one of the balls is deformed, the child argues that the deformed ball has more clay than the other ball. Even when told that nothing was added or taken away, the child does not believe they have the same amount. (2) Discrepancies can occur between two internal events, e.g., "Will you tell me the best way to drive to your house?" There are two routes to the house and the respondent is in conflict which route to present. (3) Discrepancies can occur where both events are external, e.g., the child is shown clear water and a set of colorings. He is asked to predict what would happen if two of the colors are mixed (red and green) and put into the water. After the colors are mixed, another question is posed, "Why do you think the water is colored purple and not red or green?" The discrepancy in this cases arises in the context of the action and is external to the child.

The child, however, may not be aware of discrepancies nor contradictions. Such awareness requires a developmental level where the child notices no discrepancy. When presented a drawing of a human figure with no neck or six fingers, the child may well not attend to these discrepancies in spite of the fact he knows he has a neck. To be sure, children at virtually every level notice or react to discrepancies--the infant reacts when his comfort state is disturbed and becomes quiescent when the discrepant event is handled,either through his own volition or through the intercession of the caretaker. In spite of this observation, for our purposes, as we shall see, there are many areas in the world of physical and social knowledge where the child is not apparently aware of discrepancies. In sum,

discrepancies can occur at various stages of life, the differences, however, are in kind and content.

Implications of Resolution of Discrepancy for Cognitive Growth

Movement toward discrepancy resolution is a necessary, albeit not sufficient requisite for cognitive growth. The lack of awareness of a discrepancy is interpreted as "nonattending" to that specific event. Thus, the event is not in the individual's awareness, for now we shall not concern ourselves with it. The awareness of a discrepancy produces a "cognitive conflict" and resultant tension which can but does not require resolution. Action toward resolution, however, comes about not only when the child is "aware," at any level that a discrepancy exists, but also when "intuitive awareness" (a feeling that a discrepancy exists)exists. Arousal to resolve the discrepancy leads to either mental or motor actions. These actions in the service of resolving conflicts lead to evolution of a stable (temporary) solution. Resolution thus "moves" the child from one knowledge level to another. A child building a block structure notices that whenever a Y block is placed on a tower, the tower collapses. Employment of a cube or a rectangular-shaped block, however, does not destroy the tower. Implicitly the child comes to realize that one type block is more appropriate than another. In this way, the child has extended his practical knowledge vis-à-vis balance. However, it is doubtful if the child can articulate either the principle or the heuristic rationale for such a state of affairs. Chances are, however, that in subsequent tower building the child will consistently reject a Y block and substitute the appropriate one.

Actions, then, leading to resolution, transfer the child's knowledge state from one level to another. The resolution can be temporary, since interaction with the environment is an ongoing dynamic process. The child

can resolve a problem at one stage of his development only to have a similar problem reoccur. Now, with new knowledge and experience, discrepancies reappear in what may even be the same domain. For example, children's definition of an animal or something having four legs, shifts to something that is alive. At the "four leg" period resolution of discrepancy in classification of animals with and without legs may be resolved by using the legs as a criterion, but later leggedness is no longer the most appropriate and the "living" criterion is used. Or the particular contents may change. When the child has mastered a certain body of knowledge, discrepancies may no longer occur.

Role of Inquiry in Resolution of Discrepancy

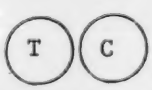
In the previous discussion, we have focused on the knowledge acquisition under conditions where the child's own action state led to discrepancy resolution. But in the context of our educational or group setting, appropriate inquiry on the part of the other person can facilitate discrepancy resolution.

At the outset of an interaction, the child is actively employing his own existing knowledge base to cope with the situation. The teacher also enters that situation with her/his knowledge. We can diagram that as follows:

State 1.

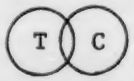
where two indpeendent parties are in contact.

The teacher notes the child's activity and the child notes the teacher present, leading to:

State 2 

The teacher observes the child is trying to build something, continuously piling block upon block. The teacher may begin dialogue and asks, e.g., "What

are you building?" The child says, "A car." This State 3 can be diagrammed to portray the teacher and child communicating. This can be diagrammed as follows:



The teacher and child have begun a process of sharing a definition of the situation. As the teacher increasingly asks questions, e.g., "Tell me more about your car?" or "Tell me about the parts of your car?" or pointing to a section of the car and asking, "What is this?", there is an increase in shared understanding of the physical features of the production, diagrammed as follows:

The shaded area depicts the shared meaning about the event. Not everything the child knows or feels about his production is shared, nor are the teacher's intentions about her/his interaction. This is the white space. The non-stated feelings, knowledge etc., may not be articulated or even be in awareness, but may impinge on the quality of the response. Children anxious in test situations may find the task boring and not say anything, but this feeling will influence what is shared and not shared. We will not develop this aspect at this time.

As the child and teacher interact in an inquiry interaction, the direction the dialogue will take and the kinds of ideas generated will vary as a function of the kinds of questions posed.

The type of question may facilitate the resolution of the discrepancy. For example, in the classic conservation task, the type of inquiry employed for assessment yields information as to the child's understanding of the problem. If, however, the experimenter or teacher would continue to employ

inquiry, the nonconserving child may become aware of the discrepancy and come to realize the equality that exists.

Of course, resolution of discrepancy also depends on what level of resolution that is sought. Forexample, let us consider a classification task. An array of objects were given a group, such objects as animals, vehicles, human dolls. The task for the child is to classify these items on the basis of class memberships. Say that the child includes some human figures in the vehicle class. The reason for such a choice may be functional--the people use vehicles. On one level, this is a nondiscrepant situation, from the point of view that any relationship is rationale. On the other hand, looking at this array from a logical hierarchical perspective, there is a discrepancy, the human figure does not "belong" in the group so created, but rather belongs to the class animal. Organization of the animals and humans into one category "living" would be a logical hierarchical arrangement. If the teacher then decides to "force" the classification to a superordinate level. Appropriate questions would perhaps facilitate the child's moving to a superordinate category. The question may well facilitate the child's becoming aware of the discrepancy.

In other words, discrepancy may be resolved by inquiry but also "discovered" by inquiry.

Let it not be construed that discrepancy is always resolved. There may well be occasions that the teacher's questions are not facilitative. The skill of the teacher becomes the critical consideration in discrepancy resolution. The skill depends on the teachers' understanding of children's cognitive development in general and the particular interaction in particular.

To this point, the argument was presented that resolution of a discrepancy can be accomplished by using inquiry. But we still have to demonstrate at least conceptually how resolution of a discrepancy can lead to cognitive growth. Thus, before proceeding to a discussion of the technical aspects of inquiring, it behooves us to develop the conceptual rationale for our position. To achieve this goal requires directing our attention to two issues: (1) an indicated relationship between discrepancy resolution, and (2) the psychological function of inquiry.

Discrepancy Resolution and Cognitive Growth

We take our lead from the Piagetian perspective that cognitive growth is a function of changes in state from a static equilibrated one to a dynamic nonequilibrated one. A discrepancy is a dynamic state of tension, as described previously, whose resolution comes about through a reorganization of an ongoing state. Where no discrepancy exists, the status quo reigns and there is therefore no external or internal need to change. The individual is cognitively organized in that knowledge states are in harmony. The child believes what he sees; his construction of reality is such that the world appears ordered.

When questions are introduced at any time, they have the potential of disturbing the equilibruium. Cognitive processes and affective states are activated.

Not only does a question disturb the equilibrium, but it also orients the child in time and space. Questions which make demands for prediction, e.g., What will happen to the glass if it is dropped? What will happen to the egg when I put it in the cake? Each of these queries orient the child toward the future. In so doing, the child, if he responds, does so

in an anticipatory sense. He has to project himself in the future. Employment of anticipatory schema in order to articulate an idea is not usual in the daily life of the child. To be sure, the individual probably does employ anticipatory scheme in planning his/her daily existence. However, the pressure to articulate the schema is not a necessary condition--in contrast to the inquiry-context where there is pressure for just such articulation.

Not only may the child be encouraged to anticipate, but also to re-present the previous experience. This demand to retrieve information forces the individual to reconstruct and consequently to re-present previous experience.

Not only can the past and/or the future be the focus, but also the present. The child can be oriented to attend to the ongoing present--where the child may be asked to attend to the observable or to infer relationships between events or objects. Where the time focus is past or the future, the child is required to mentally image events of the past and even of the future, while dealing with the parent the child may be attendant to the observable. The level of symbolization may not be as great compared to the past or future where mental imagery or other types of internal storage of information have to be employed.

To this point, we have argued that questions varying in time dimensions engage play and role in schema development. Now let us turn to the potential of other cognitive demands of questions.

Table 1 lists a number of types of descriptors categorizing mental demands that can be made on another through an inquiry. They range from descriptive-labeling to inferential types of queries. Each of these implies

Table 1

Exemplars of Distancing Question Strategies

Label (lab)	Definition:	Naming a singular object or event or action; naming a place, appropriate designation of something, locating; identify, a single discrimination; NO ELABORATION; ownership, possessives. Labelling is discrete and does not involve inference.
	Examples:	"Do you know the name of this?" "What is the color?" "What do you have on your feet?" "What do you call what she is doing?" "Where is the book?" "Whose book is this?" "Do you remember her name?"
	Comment:	To be distinguished from concept or class labelling which is symmetrical classifying (see symmetrical classifying).
Reproduce (rep)	Definition:	Reconstructing previous experiences; dynamic interaction of events, interdependence, functional; open-ended; child's organization of previous experience.
	Examples:	"What happened?" "How did you make that?" "What did we do yesterday?" "Tell me about your dream."

Table 1 (Cont'd)

Propose Alternatives (pro alt)	Definition:	Different options, different ways of performing the task; no negative aspect. Possible key words are other, another, different from before.
	Examples:	"What other way could we mix this?" "What is another way of blowing up the balloon?" "What is a different way we could catch the mice?"
	Comment:	Not additive as in "What else do we need to add?" or "Can you tell me something else?" No articulation of judgment as in a "better way to do it."
Resolve Conflict (res con)	Definition:	Presentation of contradictory or conflictful information with a resolution; problem solving; negative condition exists with focus on an alternative solution - one situation which is an impossibility needs to be resolved in another way; does include inferences of cause-effect relationships but includes an additional element of identifying the central element in one situation that can be transferred to another situation.
	Examples:	"When there is no electricity, how could we pop corn?" "Since my mike is disconnected, how could you hear me?" "What if we don't have a spoon, what else could we use?"

Table 1 (Cont'd)

Compare	Definition:	Describing or inferring characteristics or properties across classes, not within - two separate instances being compared; noting the existence of a similarity or difference, describing or inferring only how alike or different
	Comment:	No explicit statement of what characteristic is common to both is coded here, since that is symmetrical classification.
(a) Describe Similarities (des sim)	Definition:	Noting ostensive common characteristics. Perceptual analysis - comparison of sensory materials present in the interaction, e.g., objects, rhymes, pictures, etc.
	Examples:	"Are those the same?" "How are Joel's shoes like Dee Dee's?"
(b) Describe Differences (des dif)	Definition:	Noting ostensive differences among instances. Perceptual analysis - comparison of sensory aterials present in the interaction, e.g., objects, rhymes, pictures, etc.
	Examples:	"Are those different?" "How are Joel's shoes different from Dee's?" "Which foot is the big foot, mine or Adam's?"
(c) Infer Similarities (inf sim)	Definition:	Identifying nonobservational commonalities. Conceptual analysis - instances not present for sensory comparison (see comment below); analogies, part-whole relationships.
	Examples:	"Are a lion and a tiger alike?" "How are a lion and a tiger alike?" "How is Joel's story like Dee Dee's?"

a demand--but the demand also defines the process for the child. To be asked, "What color are your new shoes?" immediately structures the child's intellectual and possibly perceptual orientation. He will attend to the shoes and provide the color label. This is a much different demand than asking, "What are the shoes made of?" In each case, the child may have to attend to the physical features, but to answer the second question, the child has to enlist the aid of his memory, along with analysis of the shoe itself. Thus, a different set of processes are activated.

Other types of questions are listed in the table and it is very clear how many different functions that question can serve.

The Strategy of Inquiry

Questions can serve many functions--to elicit information or to facilitate thinking. The sequence of question asking, as well as the skill in knowing how and when to ask what type of question, become some of the initial features that any inquirer must come to master. Although it can be argued that just asking questions is enough, our hypothesis would assert that cognitive growth through inquiry will depend on the demand quality of the question. Questions which create discrepancies, pose contradictions, and require shifting of perspective are believed to influence the growth. In effect, the questions that create a dialectical interaction are considered as protypic of those that would have the greatest potential for influence.

Basic Classroom Strategies

The creation of an optimal environment for growth in representational competence leans heavily on the concept of distancing. Basically, this concept refers to aspects of the environment which stimulate the resolution

of discrepancies by the child, foster the acquisition of "conservation of meaning," and result in the growth of the child's internal representational system. Distancing can occur in verbal strategies, in activities and materials, and in classroom management (scheduling, rules, etc.).

In defining distancing, the form cannot be distinguished from the content. Thus, one cannot simply give a list of particular verbal strategies, a list of specific questions, which together make up the set of verbal distancing behaviors. Whether or not a particular question has the distancing dimension depends on its effect on the person to whom it is directed--or its potential effect given the appropriate motivational state. A question only stimulates discrepancy resolution if the child perceives the discrepancy. Furthermore, whether or not a discrepancy is perceived depends on the state of the child as well as on the particular form and content of the inquiry.

This framework is designed to help one determine when and how to use those behaviors and physical materials which have distancing potentials in ways such that their potentials are realized. Distancing potentials are realized when, through luck and/or knowledge, situational demands are appropriately matched to a child's interests and cognitive abilities. If we can decrease the dependence on luck and increase the knowledge base from which to create appropriate situations, we are way ahead of the game. In general, the teacher's knowledge base will consist of two parts: (1) knowledge of each particular child with whom one works, and (2) knowledge of strategies and procedures which increase the probability both of finding out how those children think (and what they know) and of activating their thinking processes. Fortunately, many of the same strategies which help us to find out what is in the child's mind also serve to activate the child's thought processes.

For example, when we ask the right question, instead of simply telling, we find out what the child already knows and we stimulate the child to think about the issue.[1]

Distancing behaviors can be used in all aspects of the preschool environment to activate the child's thinking. In addition, they help the teacher find out what the child thinks, how the child thinks, and what interests him. In general, one is using distancing behaviors when one tries to:

(1) Ask questions rather than giving statements.

(2) Give real choices--the kind where the child makes the decision and is helped to follow through on it.

(3) Wait, watch, and listen while the child is doing something--let the child solve his own problems and discover the consequences of his action (whenever it is safe to do so).

(4) Be responsive when the child initiates, and use questions and suggestions in teacher-initiated interactions. (Avoid being a "TV teacher.")

(5) Arrange the physical environment to stimulate problem solving (e.g., create or rearrange materials, resources, space, routines, etc.)

(6) Use distancing behaviors in socioemotional, ethical, aesthetic, and motor skill domains as well as in areas typically called "cognitive."

These are important considerations, each of which will be discussed in more detail in the sections to follow.

(1) Ask questions....

Questions are essentially two-way communications: a question usually gets an answer. But questions can do more than that--good questions foster genuine dialog. Good questions are reasonable, rational, and appropriate,

rather than mere fillers for silence. Simple "yes-no" questions or "guess what answer I'm thinking of" are not usually the most beneficial. For example, the questions listed under the "minimize" column below are to be used as little as possible since they require very little mental activity. The questions listed under the "maximize" column, however, require more mental activity on the part of the respondent and are likely to be followed up with a genuine exchange of information and opinion.

Maximize the use of questions like these:	Minimize the use of questions like these:
Tell me about this (object).	What color is this block?
What might have happened?	What is the first thing that will happen, the second, the third, etc.
What if (state opposite)...?	
Why do you think that?	Is this a spoon?

Questions can be directed towards the understanding of a concept, but throughout such a process, any answer by the child should be accepted as legitimate--not as an accurate account of reality, but as a true reflection of the child's level of thinking and his perception of reality. Follow-up questions are used to help the child move himself closer to more sophisticated understandings. When questions are used to activate thinking, they help the child focus his mental energies on the issue at hand, and, in so doing, they help him construct for himself the relevant concept.

(2) Give real choices....

Posing conflicting issues or alternatives is an important strategy. For example, one might ask:

"If I want to boil an egg should I put it in a pan with water or without water?"

or

"Would you rather build a house with blocks or with wood scraps?"

When a child has to choose between two or more alternatives, he has strong motivation for carefully examining each possibility. This is only true if two conditions are met:

(1) the choices must be mutually exclusive (e.g., you can't eat your cake and have it too); and

(2) there is some consequence of having made the choice. Thus, if a child is asked whether he'd like the soup hot or cold, and he chooses cold, he should be given it cold. If he is asked to make a prediction, he should be helped to examine why he puts faith in that alternative, he should be allowed to test it, and he should be helped to relate the results of the test to his prediction.

When these two conditions are met, the child is likely to be motivated to consider each option as thoroughly as he can. However, he still needs help in knowing how to weigh options. Questions can be used here to help him consider pertinent details, make inferences, and relate pieces of information in a way which allows him to make a rational choice.

(3) Wait, watch, listen....

No matter how good the initial question, its value can be lost by not waiting long enough between question and answer, by showing approval only for correct answers, or by accepting answers without posing alternatives. The child needs a chance to concentrate--he must understand the question, and he must formulate an answer. This takes time.

When the child has produced an answer, one can ask further questions to determine the conviction with which a child holds the response and to establish the basis for holding that point of view. These aims hold for both correct and incorrect answers. Both teacher and child benefit from such an exchange: the teacher learns more about the child's view, and the child examines his own beliefs more carefully. If given a chance to test his knowledge himself, the child may even change his beliefs in accordance with the results. When this happens, he has a good reason for holding the new belief--a better reason than one which depends on having been told to believe it by an "authority."

The guiding principle here is that whenever it is safe, let the child discover the consequences of his action himself. The teacher's role is to help keep conditions safe for testing consequences and to help the child notice and analyze the consequences. Nonverbal looks, gestures, or manipulation of materials may serve as questions which help the child attend to the consequences of his action. Verbal questions, of course, also do their part here.

(4) Be responsive....

A teacher's response to child-initiated questions serves as a model for valuing questions, giving serious thought to questions, and turning question-asking into a genuine dialog. A child's plea for information should not be ignored, but it does not have to end with a simple statement from the teacher. The teacher can help the child solve the problem when strategies like this are used: "That's a good question; let's figure it out. Is there anything else we know of that looks like that when it's wet?"

In many cases the teacher can help the child devise a way to find the answer to the question. This might involve bringing a snowball inside, asking

another child why he's hiding the book, or looking on a chart to find out whose turn is next. Questions can be used to help the child think of an appropriate way to get the information. The idea is to free the child from dependence on the teacher--not to be unhelpful or to hide information. For this reason, a good deal of judgment is needed in deciding how much help to give and when and how to give it.

In response to a child's question, the teacher engages the child in finding the answer. This is in contrast to the "TV teacher" who, in an admittedly entertaining and appealing way, takes over the problem and presents its resolution as a completed package.

(5) Arrange the physical environment....

The preschool classroom can be arranged to enhance children's use of problem solving abilities. Blocks near the dramatic play area, for example, lend themselves to use in improvising stoves, beds, etc. Signs and pictures at children's eye-level enables children to really use them for ideas and information. Activities should be arranged so that potentials for integration are obvious to the child. A teacher may remember about the clothespins in the top cupboard, but will the child? Keeping materials within children's reach and/or labeling storage spaces with pictures gives children more control over the integration of their play. It also helps them to make full use of the classroom resources in solving their own problems. The key point is to test the effect of the arrangement on children--not on what adults might do in it, nor on adult values and aesthetics.

The material one provides also influence children's full use of their developing mental abilities. Choose materials which lend themselves to a variety of purposes (e.g., sturdy blocks: construction materials like clay, lego

blocks, pipe cleaners, etc.; old cans and plastic containers, and so forth) and introduce novel materials to stimulate discussion and exploration. Even stories can be selected for how well they elicit ideas from children. A story like Good luck, bad luck, for example, can generate excited discussions of what kind of rescue or what mishap is coming up next.

Routines can also provide ways to involve children in planning and problem solving. Regularity is crucial if children are going to be able to get a feel for how much time they have to work with. A variety of signs (pictures, musical sounds, ets.) can be used to help children know what's coming next.

Finally, to foster children's comprehension of representational media, teachers should take care to illustrate an object or experience shared by the members of the class in a variety of media. Circle time activities can use 3-dimensional models, pictures, photographs, music, and pantomime to communicate stories or express feelings. Children can be helped to use a variety of media for expressing themselves when teachers suggest telling the same story in another way, for example, and when they provide a variety of materials to be used for this purpose.

(6) Use distancing behaviors in....

Children's problem-solving capacities need not be artificially limited to the so-called "cognitive" areas. Representational thinking is needed in understanding why certain rules have been set, in resolving disputes with other children, in estimating physical prowess, and in evaluating one's own preferences as well as in learning about numbers or learning about colors. Since the underlying processes are the same, teacher strategies can be expected to be similar. Questions are used to explore with the child why

he thinks it's alright to take all the crayons or how he knows he'll be able to run all the way across the play yard without stopping. The physical environment, likewise, will influence the child's developing ability to think rationally about these areas.

The result of the distancing approach to the preschool classroom is a child who interacts with his environment independently, cooperatively, and thoughtfully. Not only does he tend to use whatever capacities he already has for such interaction, but he is in an optimal environment for further developing and refining his abilities. It is an exciting and challenging environment for both children and teachers.

Otherwise,

> Education with inert ideas is not only useless; it is above all things, harmful--corruptio, optimi, pessimi.
>
> (Whitehead, 1949, p. 13)

The framework presented and the subsequent rules for question asking are consistent with a number of current theories of cognitive growth. First, let us start with the concept of an active organism. Once one is convinced that the child is an "active" organism, reaching out to engage experience, then it becomes crucial to come to terms with how the "instructional" experiences are to be arrayed. For us, the educational environment must allow the child the opportunity to discover and to construct for himself, since through activity and consequent discovery the child transforms actions into representations.

We would like to illustrate that our construction of the significance of "question asking" actually is consistent with the conceptualization of Whitehead (1949), Bruner (1973), Luria (1976) and Piaget (1951). Essentially we believe that there is considerable convergence in the fundamental assumptions regarding processes of learning and development as well as the desirable contacts for such.

First we begin with the primary construct that the child is an active organism and so in building on this concept we can accept Whitehead's orientation where he says:

> In training a child to activity of thought, above all things we must beware of what I call "inert ideas"--that is to say, ideas that are merely received into mind without being utilized or tested or thrown into fresh combinations (Whitehead, 1949, p. 13).

Emphasis on discovery learning through inquiry has precisely the effect on the learner leading him to be a constructionist to organize what he is encountering in a manner not only designed to discover regularities or relatedness, but also to avoid the kind of information drift that fails to keep account of the uses to which information might have to be put. Emphasis on discovery indeed helps the child to learn the varieties of problem solving, of transforming information for better use, and helps him to learn how to go about the very task of learning. So goes the hypothesis; it is still in need of testing. But it is an hypothesis of such important human implications that we cannot afford not to test it--and the testing will have to be in the schools (Bruner, 1973, p. 87).

Engagement in inquiry is an aid or support for enriching the child's engagement with the social and physical realities. Question asking as we have described plays a critical role because of the following features: (1) it occurs in an interactional context, (2) it employs language, and (3) it allows for expanding the range and breadth of the child's approach.

Support for these assertions comes from Vygotsky (1962), Piaget (1962) and Luria (1976). Let me just quote from these writers to demonstrate our assertions.

Luria cogently argues for the role of adult-child verbal interaction when he says

> Under the influence of adult speech, the child distinguishes or fixes on behavioral goals; he rethinks relationships between things; he thinks up new forms of child-adult relations; he reevaluates the behavior of others and then his own; he develops new emotional responses and affective categories which through language become generalized emotions and character traits. This entire complex process which is closely related to the incorporation of language into the child's mental life results in a radical reorganization of the thinking that provides for the reflection of reality and the very process of human activity (Luria, 1976, p. 11).

Adult speech or, in our terms, interaction, requires cooperation. The child must be a participant exchanging communications with the adult. Unless this occurs, the impact of the adult is reduced or can even be rendered insignificant.

> All logical thought is socialized because it implies the possibility of communication between individuals. But such interpersonal exchange proceeds through correspondences, reunions, intersections and reciprocals, i.e., through operations. Thus there is identity between intra individual operations and the inter individual operations which constitute cooperation in the proper and quasi-etymological sense of the word (Piaget, 1962, p. 13-14).

Heretofore our argument has focused on the rational and cognitive aspects of question asking. However, we must take into account the affective features involved. The initial affective aspect is the child's comfortable

willingness to engage cooperatively in the interaction. As Vygotsky says,

> Behind every thought there is an affective-volitional tendency, which holds the answer to the last "why" in the analysis of thinking. A true and full understanding of another's thought is possible only when we understand its affective-volitional basis (Vygotsky, 1962, p. 150).

The attitude and tone of the adult are probably critical features influencing the child's participation. If questions are asked in ways which connote criticism, "put down," attempting to "test" the child, the chances are that such affective features are potentially provocative--provoking the child's anxiety, reluctance to participate--in effect, encouraging a noncooperative attitude.

Unless the affective atmosphere is conducive to legitimate inquiry which is directed toward solving problems, our given is children will not engage in the spirit that would enhance cognitive development.

Thus, the adult when engaging in an inquiry encounter, should be concerned for the type and follow through in inquiry in a context that takes into account several affective conditions.

Is there any support for a question asking teaching strategy?

Relatively little systematic research has been done evaluating question asking as a teaching strategy among preschoolers. Results with older groups of elementary and secondary children have shown that learning is enhanced when high level questions are used (Buggey, 1972).

As for preschool children, we have found that children exposed to question asking programs do in fact show greater gains in problem solving tasks requiring anticipation (Cocking & Sigel, in press), memory for places (Johnson &

Sigel, 1977), and kinetic memory (Sigel & Cocking, 1977). While these results are preliminary, the differences already found are consistent with expectation.

Not only do we find differences among children who experience question asking engagements in a school setting, but also among children whose parents show preferences for question asking as informal teaching strategies. Children of parents who indicate preference for "distancing" strategies perform significantly better on cognitive tasks involving employment of anticipatory schema.

In effect, formal (school) or informal (home) educational experiences weighted in favor of questioning (distancing) strategies seem to enhance cognitive development.

The results of our research are consistent with our conceptualization of the conditions necessary for the development of representational thought. "The transition (between preschool and older children) depends upon the development of representational systems. And one of the important aspects of such development is the shift to symbolic or linguistically mediated representation"(Olson, 1966, p. 135).

The shift, we maintain, is fostered through question asking strategies providing children with the opportunity to discover, to construct, and to evaluate their social and physical reality.

Footnote

[1]The following discussion on question asking is taken from: Sigel, I. E., Saunders, R. A., & Moore, C. E. On becoming a thinker: A preschool program. Unpublished paper, Educational Testing Service, Princeton, New Jersey, 1977.

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